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This reissue supersedes and replaces all previous issues of this specification.

SID 62-1002

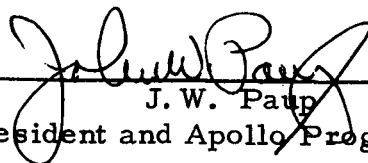
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PRELIMINARY
SCIENTIFIC INSTRUMENTATION
INTERFACE REQUIREMENTS SPECIFICATION
(U)

REISSUED 30 OCTOBER 1962

NAS9-150

Approved by


J. W. Paup

Vice President and Apollo Program Manager

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CLASSIFICATION CHANGE

To UNCLASSIFIED

By authority of GDS - Eo 11652
Changed by L. Shucky Date 12/31/72
Classified Document Master Control Station, NASA
Scientific and Technical Information Facility

NORTH AMERICAN AVIATION, INC.
SPACE and INFORMATION SYSTEMS DIVISION

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SUMMARY OF CHANGES

The following deletions, changes, and additions comprise Revision No. 1 to SID 62-1002 dated 30 September 1962:

I. Deletions

None

II. Changes

New and revised paragraphs are marked with a solid black bar on the right margin. A comparison between the original version and the revised version will reveal the change.

III. Additions

Figures 1 thru 6 have been added to Tab A.

Reason for Revision:

I. General updating.

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PRELIMINARY

SCIENTIFIC INSTRUMENTATION INTERFACE
REQUIREMENTS SPECIFICATION

1. SCOPE

1.1 Scope. - This Specification defines the interface requirements to assure compatibility between the NASA-furnished scientific instrumentation and the Apollo spacecraft.

1.2 Specification Organization. - As information becomes available TAB(s) shall be attached to this specification to describe the scientific instrumentation interface requirements for each spacecraft configuration.

2. APPLICABLE DOCUMENTS

2.1 Applicability. - The following documents of the issue in effect on the date of contract form a part of this specification to the extent specified herein.

SPECIFICATIONS

Military

MIL-E-5272	General Specification for Environmental Testing of Aeronautical and Associated Equipment
MIL-I-6181	Aircraft Equipment Interface Control Requirements

North American Aviation, Inc.
Space and Information Systems Division

SID 62-700-2	Preliminary Apollo Spacecraft Requirements Specification
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STANDARDS

Military

MIL-STD-704	Characteristics and Utilization of Aircraft Electric Power
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2.2 Precedence. - The order of precedence in case of conflict shall be as follows:

- (a) The contract
- (b) This specification
- (c) Other documents referenced herein.

3. REQUIREMENTS

3.1 General Requirements. - The NASA furnished scientific instrumentation shall be integrated into the spacecraft telemetry system by the contractor in accordance with specific instructions issued by the NASA. Conflict with the present design configuration of the spacecraft and/or telemetry system will be subject to negotiation.

3.1.1 Design. - The NASA will be responsible for the detail design for scientific instrumentation. The NASA will provide the contractor the necessary information, including design drawings and unique equipment orientation, and arrange the necessary contact with other Government contractors, furnishing such instrumentation, to ensure compatibility and to allow integration of the design with the command module configuration.

3.1.2 Scientific Package. - Scientific instrumentation will be installed in the quantities specified in appendices attached hereto and under the conditions specified in the TAB(s).

3.1.2.1 Packaging Arrangement. - Scientific instrumentation packages shall conform to the physical dimensions of the spaces allocated for this purpose. The specific volume configurations are shown in figures 1 through 4.

3.1.2.2 Mockups. - Mockup or prototype instrumentation will be provided by the NASA for the initial preflight tests where requirements are called out for weight distribution and size.

3.1.3 Toxic Materials. - Materials which could release corrosive fumes or gases will not be used. No materials will be used which can liberate gases, fumes, or particles hazardous to human life or which may adversely affect comfort or efficiency of personnel. External finish of the scientific instrumentation package(s) will not release toxic products when heated to 200° F in an atmosphere of 99% pure oxygen.

3.1.4 Power Requirements. - The power source for the scientific instrumentation package(s) furnished by the NASA shall be supplied by the spacecraft power system of 115/200 volts, 400 cps, 3 phase, or 28± 3 volts, dc.

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3.1.4.1 Transient Voltage Limits. - Limits 2 and 3 of the transient ac voltage step-function loci limits and the transient frequency limits, and limits 2 and 3 of the transient dc voltage step-function loci limits of Standard MIL-STD-704 shall apply for the ac and dc voltages specified herein.

3.1.4.2. Grounding. - All electrical grounding of the scientific instrumentation package(s) shall be external.

3.1.4.3 Power Allocation. - For earth-orbital missions not exceeding a period of 24 hours, electric power up to 200 watts of continuous electrical energy shall be available. Any increase in demand shall be allocated during off-peak load requirements. No electric power has been allocated for a 14 day mission on a continuous basis. A total of 400 watt-hours shall be available during off-peak load periods.

3.1.5 Radio-Interference Suppression. - Radio-interference level generated by any component shall be held within the limits listed in MIL-1-6181.

3.1.6 Vibration, Shock, and Impact. - Scientific instrumentation operation and survival will be predicated upon the vibration, shock, and impact requirements for the spacecraft under transportation, handling, storage, and operating conditions as specified in Specification SID 62-700-2.

3.1.7 Explosion-Proofing. - Any electrical component of the scientific instrumentation package(s) capable of igniting an explosive mixture of gases will be designed to pass the explosion-proof test requirements of Procedure III of Specification MIL-E-5272.

3.1.8 Weight Allocation. - The weight allocation for scientific instrumentation shall not exceed a total of 250 pounds.

3.1.9 Space Allocation. - The space allocated for scientific instrumentation shall be approximately 10 cubic feet. (See figures 5 through 6.)

3.1.9.1 Display. - No space has been allocated for the presentation of scientific instrumentation data on the on-board display panel.

3.1.10 Environments. - The environmental requirements for the interfaces between the scientific instrumentation and the spacecraft shall be as specified in Specification SID 62-700-2 (as applicable).

3.1.11 Installation. - The contractor shall be responsible for the installation of all scientific instrumentation.

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3.2 Data Recording and Telemetry Interface Requirements.

3.2.1 Recorder. - Nine analog channels of 50 cps to 10 KC frequency are presently planned for flight instrument measurements. A partial allocation of data storage channels may be made for scientific instrumentation.

3.2.2 Telemetry. - Four channels at 10 samples/sec for scientific instrumentation have been allocated from the 32 kilobit PCM data rate telemetry. Additional requirements will be subject to negotiation.

3.2.3 Signal Conditioning Requirements. - It is desirable that the NASA provide the scientific instrumentation with adequate signal conditioning equipment, where applicable. If it is required that NAA provide all or a portion of the signal conditioning equipment, this will be considered an additional task and subject to negotiation. The output signal(s) will be either analog or digital in form and be compatible within the signal range of telemetry data system.

3.2.4 Signal Characteristics. - The signal characteristics of the scientific instrumentation packages will be as follows:

(a) Recorded Data-Digital:

Source impedance = 100 ohms for a binary 1
5 ohms for a binary 0

Input impedance = 20K ohms

Input voltage range = $0 \pm .5$ vdc for binary 1
 $6 \pm .5$ vdc for binary 0

(b) Recorded Data - Analog:

Source impedance: not yet specified

Input impedance: 100K ohms.

Input voltage: 0.05 to 5 volts, p-p.

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(c) Telemetered Data - Digital:

Source impedance: 5 K ohms or less
Input impedance: 25 K ohms
Input voltage: 0 ± 0.5 vdc for binary 0
+ 3 to + 10 vdc for binary 1

(d) Telemetered Data - Analog:

Source impedance: 5 K ohms or less
Input impedance: 1 Megohm
Input voltage: 0 - 5 vdc.

4. QUALITY ASSURANCE

4.1 Reliability. - The reliability of the interface between the scientific instrumentation and the spacecraft shall be as specified in Specification SID 62-700-2 (as applicable).

4.2 Testing. - The contractor, in joint effort with the NASA, shall plan and schedule overall spacecraft systems test and test programs to include scientific instrumentation tests. The contractor shall be responsible for the preparation of such tests and test schedules and for assuring that the tests are adequate for overall instrumentation test objectives. The contractor shall conduct such overall spacecraft systems tests. Unless the contractor is instructed otherwise, the NASA will be responsible for conducting the scientific instrumentation portions of these tests. The contractor shall be responsible for readiness of the spacecraft for test, with the NASA advising the Test Director of the readiness of the scientific instrumentation.

5. PREPARATION FOR DELIVERY

5.1 Delivery Schedule. - To be determined.

6. NOTES

None

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APPENDIX I

The following list of scientific instrumentation will be provided in the quantities noted for the following spacecraft mission. (Specification Amendments shall be used to add or modify mission requirements after contract definitization.)

EARTH ORBITAL MISSION

<u>QUANTITY</u>	<u>DESCRIPTION</u>	<u>IDENTIFICATION</u>	<u>UNIT WEIGHT POUNDS</u>
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The contractor is awaiting
definition of the scientific
instrumentation by NASA

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APPENDIX II

The following list of scientific instrumentation shall be provided in the quantities noted for the following spacecraft mission. (Specification Amendments shall be used to add or modify mission requirements after contract definitization.)

CIRCUMLUNAR MISSION

<u>QUANTITY</u>	<u>DESCRIPTION</u>	<u>IDENTIFICATION</u>	<u>UNIT WEIGHT POUNDS</u>
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The contractor is awaiting
definition of the scientific
instrumentation by NASA

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APPENDIX III

The following list of scientific instrumentation shall be provided in the quantities noted for the following spacecraft mission. (Specification Amendments shall be used to add or modify mission requirements after contract definitization.)

LUNAR ORBITAL MISSION

<u>QUANTITY</u>	<u>DESCRIPTION</u>	<u>IDENTIFICATION</u>	<u>UNIT WEIGHT POUNDS</u>
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The contractor is awaiting definition of the scientific instrumentation by NASA

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TAB A

SCIENTIFIC INSTRUMENTATION
FOR
SPACECRAFT AFRM-011

THIS TAB, WHICH FORMS A PART OF
SID 62-1002, SHALL BE EXPANDED WHEN
ADDITIONAL DATA BECOMES AVAILABLE.

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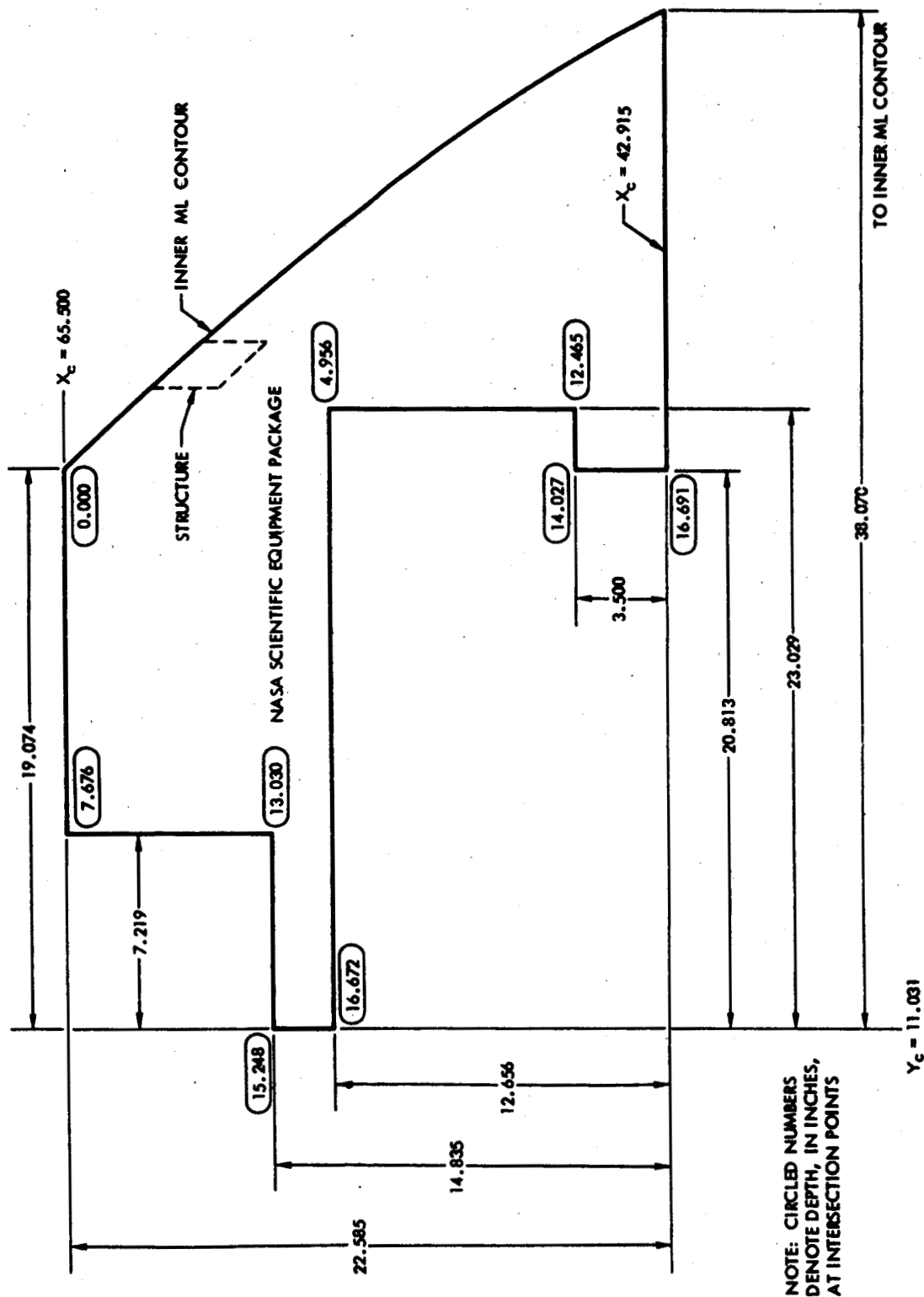


Figure 1. Location of NASA Scientific Equipment Package

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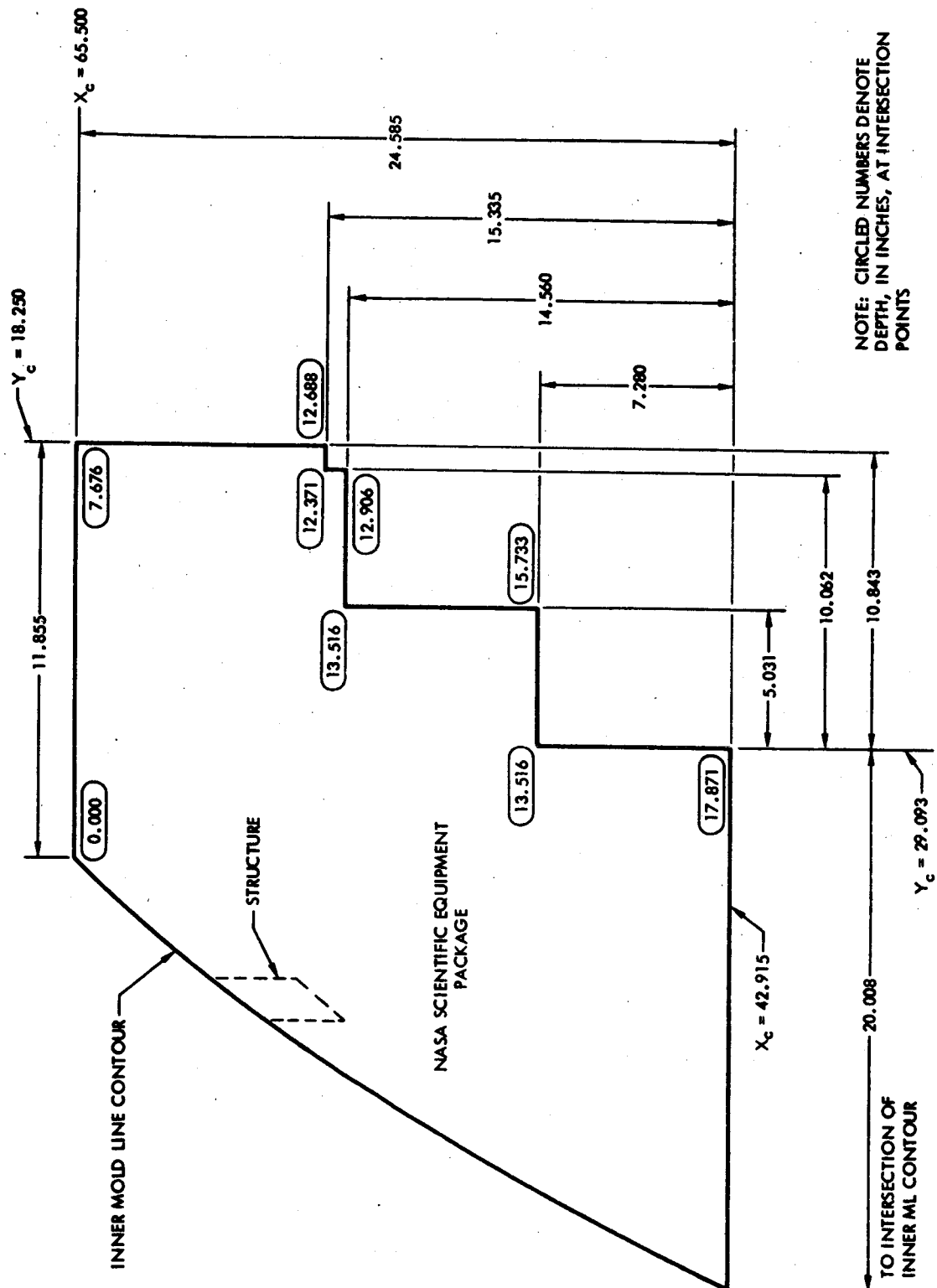
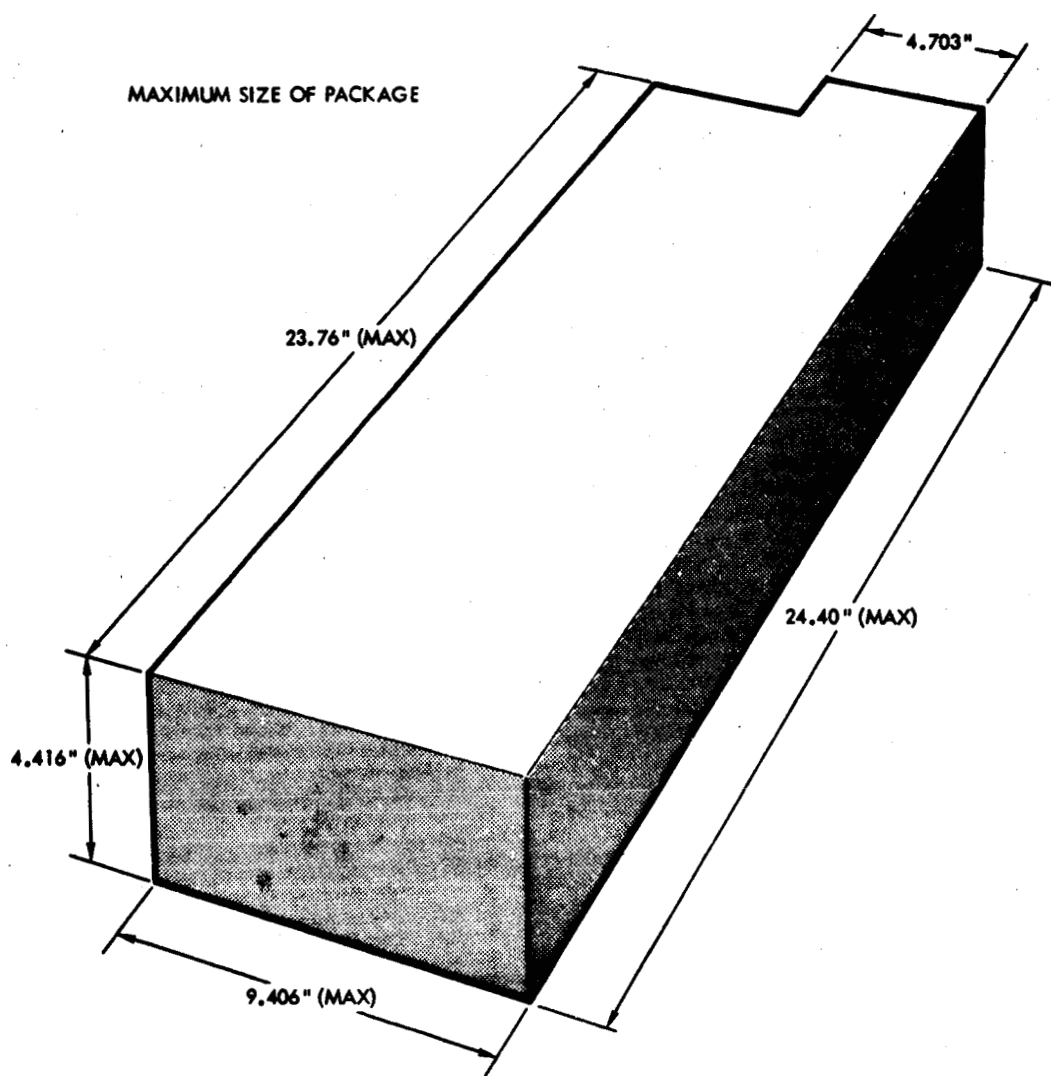


Figure 2. Location of NASA Scientific Equipment Package

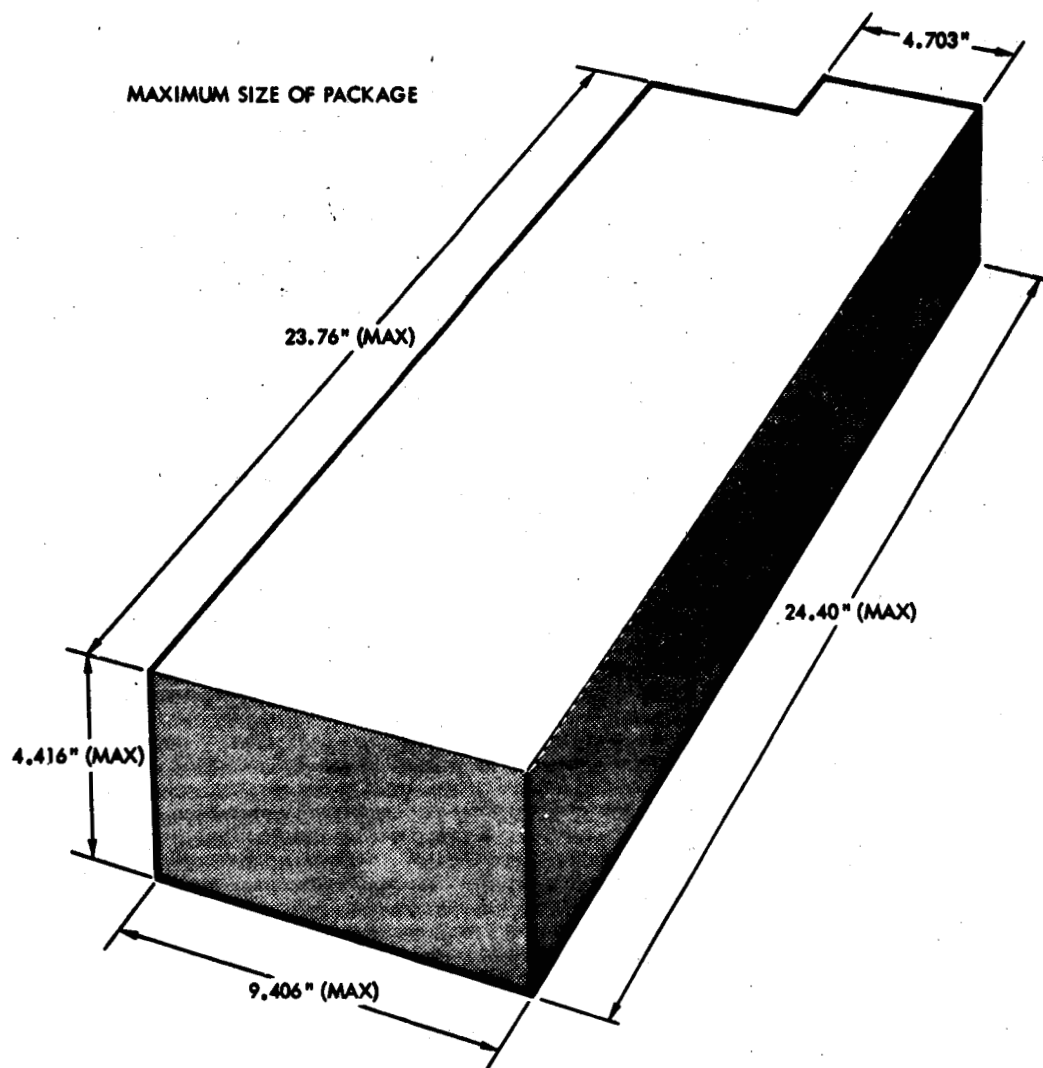
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VOLUME AVAILABLE: 982.0 CUBIC INCHES (COLDPLATE AT TOP SURFACE)

Figure 3. Dimensions of NASA Scientific Equipment Package

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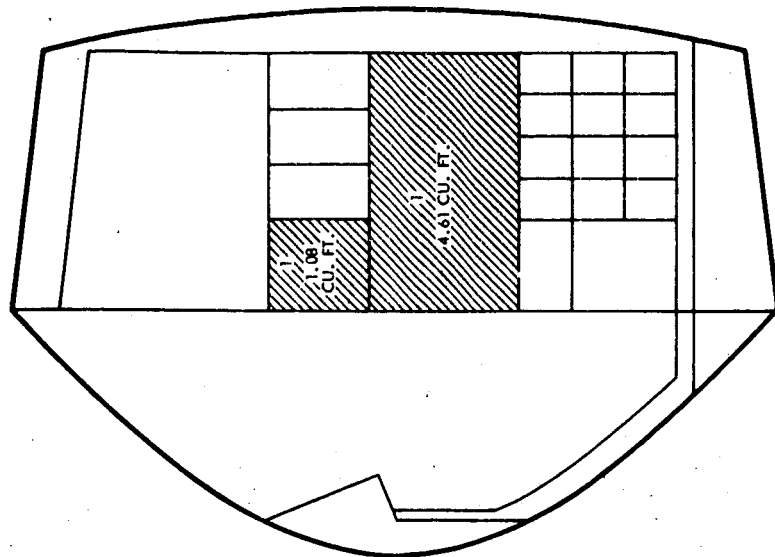
VOLUME AVAILABLE: 1000.1 CUBIC INCHES (COLDPLATE AT BOTTOM SURFACE)

Figure 4. Dimensions of NASA Scientific Equipment Package

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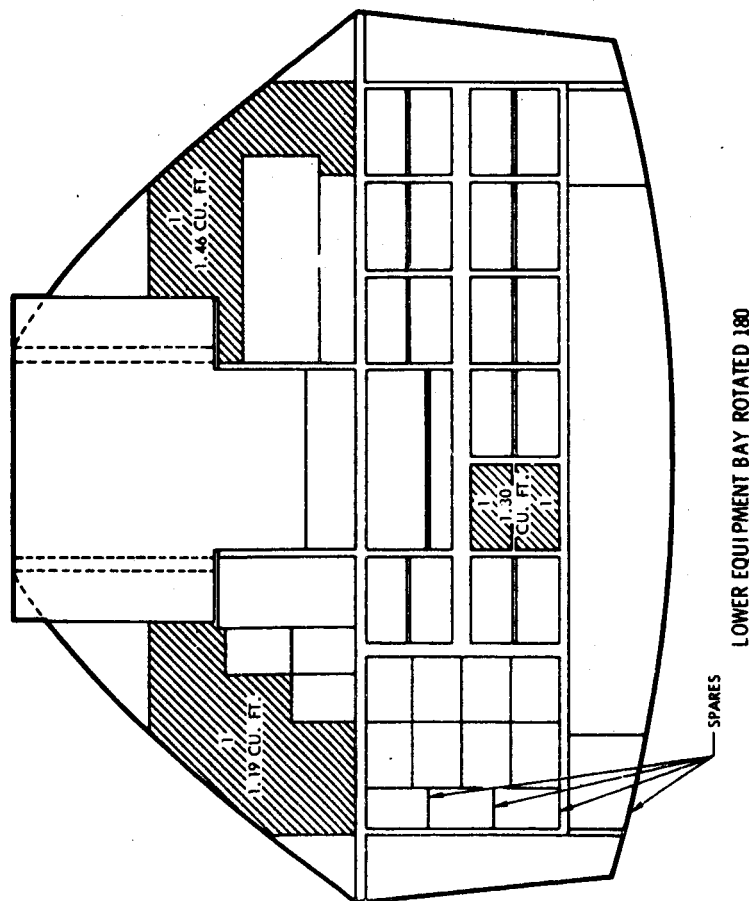


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R. H. EQUIPMENT BAY

NOTE:
PRELIMINARY
FINAL VOLUME OF SCIENTIFIC
EQUIPMENT WILL BE 10.00 CU. FT.



LOWER EQUIPMENT BAY ROTATED 180

LEGEND
1 SCIENTIFIC EQUIPMENT

Figure 5. Scientific Instrumentation Space Allocation

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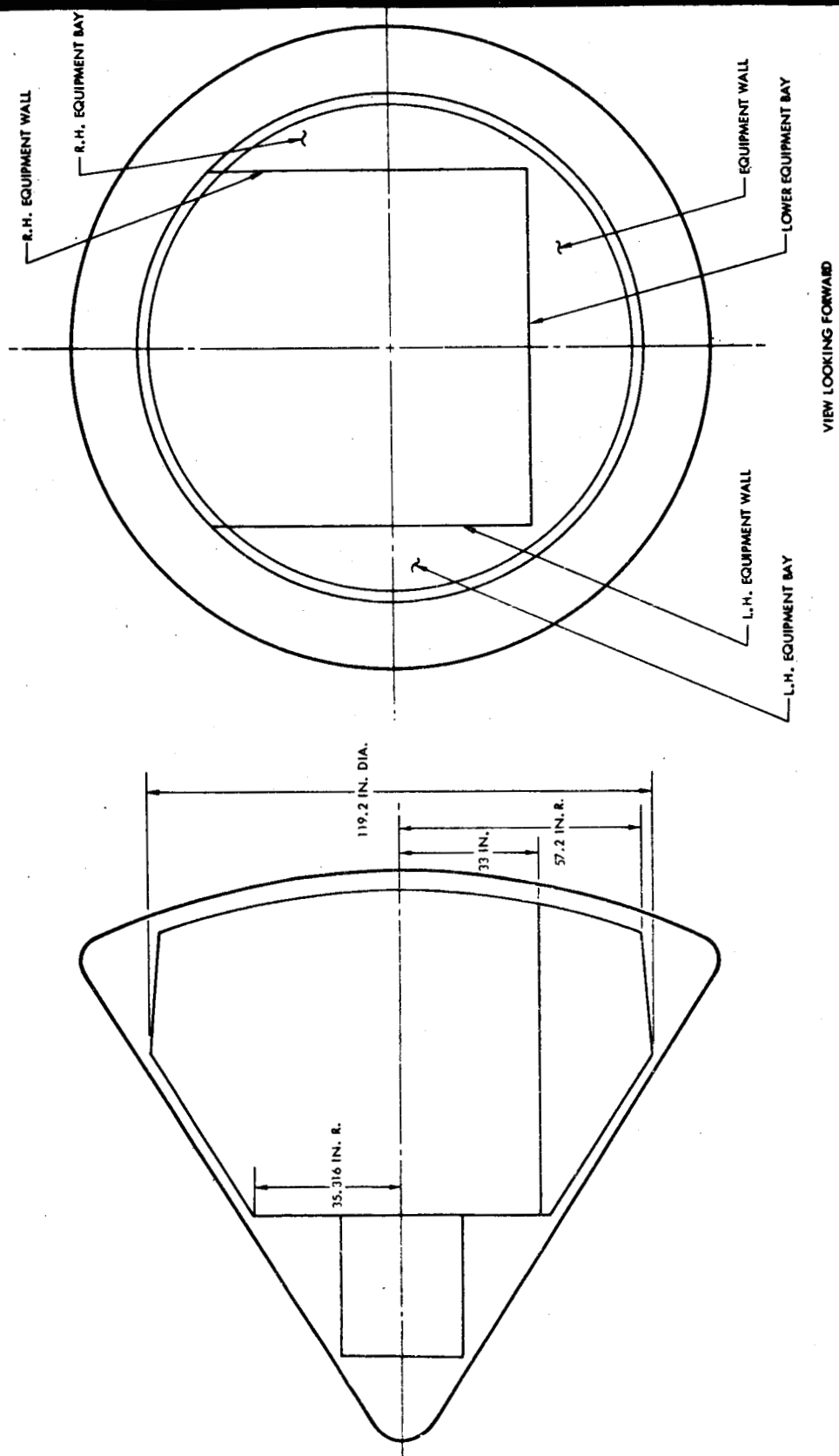


Figure 6. Equipment Bay Location

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